covers the subtractive etch metallic cap; and

a damascene conductive wiring line structure within the second insulative layer such that the damascene conductive wiring line structure is above the subtractive etch metallic cap and is conductively coupled to the subtractive etch metallic cap.

42. An electronic structure, comprising:

a substrate layer that includes a first electronic device;

a first insulative layer on the passivating layer and in mechanical contact with the passivating layer, wherein the first insulation layer comprises a material selected from the group consisting of phososilicate glass and borophososilicate glass;

a first damascene conductive wire/stud having a lower portion in the first insulative layer and an upper portion above the first insulative layer;

a subtractive etch metallic cap on the upper portion of the first damascene conductive wire/stud and in conductive contact with the first damascene conductive wire/stud;

a second insulative layer on the first insulative layer, wherein the second insulative layer covers the subtractive etch metallic cap; and

a damascene conductive wiring line structure within the second insulative layer such that the damascene conductive wiring line structure is above the subtractive etch metallic cap and is conductively coupled to the subtractive etch metallic cap.

REMARKS

Currently pending claims 1-14 and 29-42 are for consideration by the Examiner. Claim 1

was previously amended prior to the present office action response. No claims are amended herein in the present office action response.

The Examiner rejected claims 1-7, 9-14, 29, 32-39 and 42 under 35 U.S.C. §103(a) as being unpatentable over prior art Figures 1-3E in view of Farooq et al. (5,705,857).

The Examiner rejected claim 8 under 35 U.S.C. §103(a) as being unpatentable over prior art Figures 1-3E and Farooq et al. (5,705,857) as applied to claim 1 above, and further in view of Cheek et al. (6,018,180).

The Examiner rejected claims 30-31 and 40-41 under 35 U.S.C. §103(a) as being unpatentable over prior art Figures 1-3E and Farooq et al. (5,705,857) as applied to claims 1-7, 9-14, 29, 32-39 and 42 above, and further in view of Christensen et al. (6,121,659).

Applicants respectfully traverse, with the following arguments, the rejections under §103.

35 U.S.C. §103

The Examiner rejected claims 1-7, 9-14, 29, 32-39 and 42 under 35 U.S.C. §103(a) as being unpatentable over prior art Figures 1-3E in view of Farooq et al. (5,705,857). The Examiner alleges that "Prior Art Figures 1-13E teach an electronic structure **10**, comprising: a substrate layer **12** that includes a first electronic device **20**; a passivation layer **48** on the substrate layer an in mechanical contact with the substrate layer, wherein the passivating layer is on the first electronic device and is in mechanical contact with the first electronic device; a first insulative layer **49** on the passivating layer and in mechanical contact with the passivating layer; a first damascene conductive wire/stud **61** having a lower portion in the first insulative layer and an upper portion above the first insulative layer; a second insulative layer **7** on the first

insulative layer; a damascene conductive wiring line structure **8** within the second insulative layer; the lower portion of the first damascene conductive wire/stud is conductively coupled to a first portion **23** of the first electronic device; a second damascene conductive wire/stud **62** having a lower portion in the first insulative layer and an upper portion above the first insulative layer, wherein the lower portion of the second damascene conductive wire/stud is conductively coupled to a second portion **22** of the first electronic device; the first electronic device being a MOS field effect transistor (FET), wherein the first portion of the first electronic device includes a gate of the FET, and wherein the second portion of the first electronic device is selected from the group consisting of a source of the FET and a drain of the FET; the substrate layer further comprising a second electronic device **30**, and wherein the electronic structure further comprising: a second damascene conductive wire/stud having a lower portion in the first insulative layer and an upper portion above the first insulative layer, wherein the lower portion of the second damascene conductive wire/stud is conductively coupled to the second electronic device; and a damascene conductive wiring line **67** within the second insulative layer, wherein the damascene conductive wiring line is above the second damascene conductive wire/stud and is insulatively isolated from the second damascene conductive wire/stud; a shallow trench isolation (STI); an internal seam or void oriented lengthwise within the first damascene conductive wire/stud; and a conductive liner **68**. However, Prior Art Figures 1-3E fail to teach a metallic cap. Farooq et al. teach a metallic caps **23** (having a preferred thickness of about 0.100 to 1.000 microns) of an electrically conductive material selected from the group consisting of aluminum, chromium, cobalt, gold, nickel, palladium, platinum, silver, to name a few that is in contact with the upper portion of a conductive wire and is different from the conductive copper stud **18**; a dual damascene **28** within

a second insulative layer (passivation) **30** (which covers metallic cap **23**) such that a dual damascene **128** is above the second metallic cap **23** and is conductively coupled to the second metallic cap; and a conductive wiring line structure **131** is above and in contact with metallic cap **23** (Figures 4-5, cols. 4-5, lines 9-67 and 1-36, respectively). Farooq et al. further teach Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the structure of Prior Art Figures 1-3E with the metallic cap of Farooq et al. to reduce process variability."

Applicants respectfully contend that claim 1 is not unpatentable over prior art Figures 1-3E in view of Farooq, because prior art Figures 1-3E in view of Farooq does not teach or suggest each and every feature of claim 1. Note that claim 1 has seven elements with each of the seven elements having the limitations shown in claim 1. The seven elements of claim 1 are: (1) a substrate layer, (2) a passivating layer, (3) a first insulative layer, (4) a first damascene conductive wire/stud, (5) a subtractive etch metallic cap, (6) a second insulative layer, and (7) a damascene conductive wiring line structure. The discussion of prior art FIGS. 1-3E in the "Related Art" section of the present patent application describes elements (1) - (4). The "Detailed Description of the Invention" section of the present patent application describes elements (5)-(7). Nonetheless, the Examiner has attempted to force fit elements (1)-(4) and (6)-(7) into the prior art FIGS. 1-3E and has relied on the Farooq reference for element (5) (i.e., the subtractive etch metallic cap). This approach by the Examiner is like trying to fit a round peg into a square hole. The problem with this approach is that, regardless of whether Farooq could be combined with the prior art of FIGS. 1-3E, it is physically impossible for the subtractive etch metallic cap (hereinafter, "metallic cap") to satisfy all of the limitations in claim 1 if the

Examiner's arguments with respect to elements (1)-(4) and (6)-(7) are accepted (for the purpose of the following argument only), as will explained next.

Element (5) requires the metallic cap to be on the upper portion of the first damascene conductive wire/stud, and element (4) requires the upper portion of the first damascene conductive wire/stud to be above the first insulative layer. Therefore the metallic cap must above the first insulative layer. However, element (6) requires the second insulative layer to cover the metallic cap, and also requires the second insulative layer to be on the first insulative layer. Thus, the metallic cap must be disposed between the first insulative layer and the second insulative layer, which is physically impossible in prior art FIGS. 3B, 3D, and 3E, inasmuch as the Examiner has identified layers 49 and 7 as the first and second insulative layers, respectively. Element (7) reinforces this physical impossibility, since element (7) requires the damascene conductive wiring line structure to be above the metallic cap, which is likewise physically impossible in prior art FIGS. 3B, 3D, and 3E.

It is also important to note that the directional aspects of the words "on" and "above" (and related words) in claim 1 are interpreted in FIGS. 3B, 3D, and 3E as follows: a structure X is above a structure Y, or equivalently X is on Y, if a straight line from Y to X is projected in the direction 99 in FIGS. 3B, 3D, and 3E. The preceding interpretation of the directional aspects of on" and "above" in FIGS. 3B, 3D, and 3E is consistent with the Examiner's argument that the passivation layer 48 is on the substrate layer 12, and that the first damascene conductive wire/stud 61 has a lower portion in the first insulative layer 49 and an upper portion above the first insulative layer 49. The Examiner's arguments would be inconsistent with a contrary interpretation of "on" and "above" in application to FIGS. 3B, 3D, and 3E.

The Examiner did not even attempt to argue that it is possible to add a metallic cap to the structure of FIGS. 3B, 3D, and 3E while meeting the limitations on the metallic cap in claim 1. Instead, the Examiner attempted to show that the metallic cap meets the limitations of claim 1 by reference to structures disclosed in Farooq. Applicants respectfully maintain that this attempt by the Examiner is incorrect. Once the Examiner established from prior art FIGS. 3B, 3D, and 3E an **antecedent basis** in the first insulative layer 49 and the second insulative layer 7 in the prior art FIGS. 3B, 3D, and 3E, the Examiner became obligated to show that the metallic cap satisfies the limitations of claim 1 with respect to the first insulative layer 49 and the second insulative layer 7 in the prior art FIGS. 3B, 3D, and 3E. Applicants maintain that to argue that the metallic cap satisfies the limitations of claim 1 with respect to first and second insulative layers in Farooq is to argue susing first and second insulative layers that lack antecedent basis.

Additionally, Applicants respectfully contend that the Examiner has not presented a persuasive argument for combining Farooq with the prior art FIGS. 1-3E in rejecting claim 1. The Examiner argues that "it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the structure of Prior Art Figures 1-3E with the metallic cap of Farooq et al. to reduce **process variability**" (emphasis added). Applicants contend that the term "process variability" is vague and unclear. The Examiner has not defined "process variability" or explained how "process variability" applies to claim 1 for combining Farooq with the prior art FIGS. 1-3E. It is unclear as to what the Examiner means by "process" inasmuch as claim 1 is a structure claim and not a process claim. Moreover, it is unclear as to what type of "variability" the Examiner has in mind in relation to "process". Thus, Applicants maintain that the Examiner's stated reason for combining Farooq with the prior art of FIGS. 1-3E

is not persuasive.

Based on the preceding arguments, Applicants respectfully maintain that claim 1 is not unpatentable over Farooq et al., and that claim 1 is in condition for allowance. Since claims 2-7, 2-14 and 29-40 depend from claim 1, Applicants contend that claims 2-14 and 29-40 are likewise in condition for allowance.

Applicants respectfully contend that the rejection of claim 42 under 35 U.S.C. §103(a) is improper for the same reasons presented *supra* in relation to claim 1.

The Examiner rejected claim 41 under 35 U.S.C. §103(a) as being unpatentable over prior art Figures 1-3E and Farooq et al. (5,705,857) as applied to claims 1-7, 9-14, 29, 32-39 and 42 above, and further in view of Christensen et al. (6,121,659). Applicants respectfully contend that the rejection of claim 41 under 35 U.S.C. §103(a) is improper for the same reasons presented *supra* in relation to claim 1.

CONCLUSION

Based on the preceding arguments, Applicants respectfully believe that claims 1-14 and 29-42 and the entire application meet the acceptance criteria for allowance, and therefore request favorable action. If the Examiner believes that anything further would be helpful to place the application in better condition for allowance, Applicants invite the Examiner to contact Applicants' representative at the telephone number listed below.

Date: 01/08/2003

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